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CONTRIBUTIONS TO THE HISTORY OF THE DEVELOPMENT OF THE PYRENOMYCETES.

(Plate XI.)

By FRANZ VON TAVEL.

[*Continued from page* 58.]

III. FENESTELLA PLATANI, *n. s.*

Several dry branches of *Platanus* attacked by *Discula platani* and two forms of *Cytispora* were placed in moist air and left to themselves. It was the end of October before the observations could be taken up again. The *Cytispora* forms were still present, and between them protruded a number of long black necks of the perithecia of a Pyrenomycete not described in any of the systematic works which we used. It was, therefore, very minutely examined; its development could not, of course, be followed out completely, but it yielded some noteworthy results.

The starting point of the investigation was, as has been said, a form of *Cytispora*. The great variability of this form makes it doubtful whether or not it is identical with *C. platani*, described by Fuckel, E. F. N., No. 334. While still in the younger stages *Cytispora* shows itself on a branch in the form of small swellings 1–3 millimeters in diameter. The bark soon ruptures and the well known worm-shaped masses, which here have a waxy-yellow and often a whitish color, project through the openings. Upon removing them a black body, the stroma, may be seen through the crack in the bark. The stroma continues to increase in size, making the opening in the bark wider and then projecting through it. In the meantime new spore-masses protrude. The branches were kept in tall cylindrical jars containing some water at the base. It was apparent that the largest stromata existed at the base of the branches while the fungus developed very sparingly at the tips. It seems, therefore, that a high degree of moisture promotes the growth of the fungus. Fully-developed specimens of *Cytispora* often attain a diameter of one-half a centimeter; ten spore-masses may project from the stroma at the same time. In old individuals the stroma frequently spreads over the surface of the branch, if only to a limited degree.

The structure of a fully-developed *Cytispora* is made clear by longitudinal and tranverse sections. The bark has been destroyed and broken through by a cone-shaped stroma which also sends hyphæ into the surrounding cells of bark parenchyma and breaks them down. This stroma is composed of a dense mass of irregularly-interwoven, coarse, brownish hyphæ. Within this are a greater or less number of cavities which are not surrounded in the young stages by specially-differentiated cell-layers, but in the older stages are inclosed by a brown or black wall; they are round at first, but finally irregular in form, possessing numerous folds and invariably lined with a hymenium. The development of the stroma begins from below and grows strongly toward the surface and a little toward the sides. The hyphæ at the apex which come in contact with the air swell up. * * * Even before the stroma has broken through the bark we can see in it dense knots of hyphæ distinguished by their transparency, which steadily increases after they attain their full size, which is very indefinite. The growth ceases in the interior while it continues at the periphery. Consequently cavities arise into which spore-forming hyphæ immediately grow from all sides. The pycnidia retain the power of growth for some time, and, therefore, frequently become adjacent or grow against obstacles so that their circumference is often very irregularly wrinkled. By the growth of the stroma they come to the surface, where their wall disintegrates and the spores escape. The pore, a special arrangement for the perforation of the wall, which is often present, is lacking in this case. The wall of the pycnidium arises from the knot of hyphæ and often can scarcely be distinguished from the stroma. In younger specimens it can usually be seen simply as a brown layer surrounding the cavity. In old specimens, however, and on pycnidia that have reached the surface, it often attains a considerable thickness and is dark brown or black. This is particularly the case with pycnidia, which together with the stroma extend over the surface of the branch. These protrude for a long distance out of the stroma; but the beginnings of the pycnidia occur only in the basal portion of the stroma.

The basidia are simple and filiform and cut off spores in immense numbers. The spores are one-celled, colorless, straight, and cylindrical. Their size is very variable; generally they are 3–4μ long and 1–2μ in diameter, but they have been observed 12μ long and 5μ in diameter.

It may be added here that the *Cytispora* under consideration is exceedingly variable. The size and shape of the stroma and pycnidia and the number of the latter are very inconstant. In view of this case too much care can not be taken in systematic investigations of this kind of fungi. The greatest weight should be laid on the form of the basidia and spores, since these show relatively the greatest constancy.

When the stroma of *Cytispora* has reached a certain size the formation of pycnidia gradually ceases, and is replaced by the development of perithecia; this occurs independently of the time of year, only requiring a sufficient amount of moisture. Moreover, only the feebly-developed stages of the *Cytispora* are found in the open air, and no perithecia at all.

The perithecia first appear at the base and are most numerous in the center of the stroma, while the pycnidia occupy the circumference. The first beginnings of the perithecia consist of small, globose knots of hyphæ, plainly visible on account of their greater transparency, which distinguishes them from the darker stroma. They are clothed on the outside by a layer of fine, delicate, brownish hyphæ, which are more or less parallel and run in the direction of the axis. The knots themselves consist of pseudo-parenchyma, whose cells are small and thin-walled but stronger than those of the outer layer. In what follows, the latter will be designated as the *outer* and the former as the *inner* perithecium wall. Within this pseudo-parenchyma an organ has been twice observed which might be called " Woronin's hypha " or perhaps an " ascogonium." In the first or younger stage it was, as compared with the surrounding tissue, a spirally coiled hypha with two turns and filled with dense protoplasm, which distinguished it clearly from its surroundings. The second case observed was of an older stage. The mass of tissue forming the young pycnidium was larger, but its structure was essentially the same. In this case the place of the pseudo-parenchyma was nearly filled up by a large coarse hypha which was wound up into a knot. It was no longer a simple spiral, but had a more complicated form. As far as could be made out it consisted of two or three coils, lying one within another, with simple ones at both the top and bottom. Here, too, the cell contents were denser than in the surrounding tissues. In this case some few cells were especially prominent on account of their size, but it could not be decided whether or not they were connected with the large hyphæ or were the beginnings of future asci.

In spite of a continued search we failed to observe any other stages. It is difficult to hit upon just the right stages of development, for thin sections of these stromata are not easily made, and the hyphæ in question may not always be so well developed. It therefore remains to be seen whether this hypha is directly connected with the formation of the asci; that is, whether it is an ascogonium or Woronin's hypha.

In older stages the circumference of the perithecium is considerably larger. A very rapid growth takes place at the apex, forming a perithecium neck which penetrates the stroma. The neck is for a long time of nearly the same diameter as the perithecium, and it is not until it projects above the stroma that the lower portion increases in circumference. The differentiation of tissues observed in the earliest stages can also be seen later on. The outer wall, whose hyphæ in the meantime have become coarser and browner, surrounds the entire reproductive body, and the neck is formed from it. It is composed of hyphæ which are parallel to its long axis and which, diverging on the surface, clothe it with a kind of felt. The hyphæ on the inside which line the neck canal also bend outward and form hairs. These are all directed obliquely upward so as to permit the escape of the spores but to guard the entrance to the perithecium. In the older as well as the earliest stages the inner wall is composed of a colorless thin-walled pseudoparenchyma, and surrounds the entire cavity of the perithecium with the exception of the neck. The origin of this cavity and of the neck canal can not be definitely decided. The paraphyses and asci arise from the inner wall; the former are present in large numbers and are very long, slender, and thin walled. Their contents consist of finely granular protoplasm containing many globules that reflect the light.

In their earlier stages the asci are composed of extremely delicate club-shaped cells filled with strongly refracting protoplasm. Their wall remains very delicate even when they are fully grown. The form of the mature ascus is that of a cylinder, obtuse at the upper end and suddenly contracted below into a short, slender pedicel. It contains eight spores, which are oval, dark-brown, and three-septate at maturity. The two middle cells are each again divided by an oblique wall, which disappears when the spore is turned through an angle of 90° (Fig. 6). Very rarely there are a greater or less number of cell walls than stated above. The spores are slightly constricted in the planes of the septa, and the whole is surrounded by a thin, gelatinous layer. The length of the spore averages 14–18μ, the diameter 5–9μ.

The details of the perithecium having been fully examined, the point has been reached when the systematic position of the fungus should be more thoroughly considered. The main points upon which this depends are the following: The brown spores with their longitudinal and transverse septa; the presence of paraphyses; the existence of a stroma, if only an imperfectly developed one, which is certainly Valsoid, as is proved by the fact that it is very small in circumference and has perithecia projecting from the center and pycnidia from the circumference (Fig. 7). Of all known genera *Fenestella* is the only one which can be considered, since it is characterized by the above-mentioned points. Besides, there is no reason why the fungus should not be placed in this genus. It should be mentioned, however, that in most species of *Fenestella*, especially the native species *F. princeps*, the spores have many more septa; yet Saccardo mentions those having but few. This species differs from all other *Fenestellæ* in the great development of the neck, which gives it the appearance of a *Valsa*, and when the color of the spores is taken into consideration it stands very close to a *Pseudovalsa*. It may therefore be decided, merely on account of the longitudinal septa (which, as stated above, are visible only in a certain position of the spore) that it should be classified not as a *Pseudovalsa* but a *Fenestella*. Although the presence or absence of two walls is a very small matter in itself, and certainly one to which no great systematic value can be attached, it would nevertheless, under the present system of classification, be impossible to do otherwise without revising the characteristics of an entire genus and rendering its position in Saccardo's artificial system impossible. These questions are for systematists to decide; in the present investigation it is perfectly immaterial whether its object is called *Fenestella* or *Pseudovalsa.*

As to the species, the one under consideration varies in the structure of its spores from all known species; that is, from all *Fenestella* and *Pseudovalsa* species cited in Saccardo's "Sylloge Fungorum." It can therefore be given the name of *Fenestella platani.*

The ascospores retain the power of germination for a long time. Material that had been kept dry for five months yielded the same results as that which was fresh. This question now suggests itself: Into what do the ascospores develop? The resulting body differs with the substratum. Cultures in nutritive solutions gave different results than those on fresh *Platanus* leaves. We will first follow the development of the fungus in a nutritive solution.

In water, in a nutritive solution like a decoction of the plum, grape juice, or extract of meat, or in some such solution thickened with gelatine, the ascospore germinates, as a rule, within twenty-four hours. Germ tubes arise sometimes from all, sometimes from only one cell in the spore. They penetrate the strong spore membrane, and the protoplasm passes from the spore into the germ-tube, giving the former a paler appearance. Generally the germ-tube swells up immediately after its exit from the spore; this is especially the case in water cultures where the fungus does not develop any further. In this case the germ-tubes generally remain quite short, sometimes becoming almost globose and beginning to cut off spores. Under favorable conditions they grow somewhat longer and even branch, but become divided up into short roundish cells and form gonidia at the apex (Fig. 8). These are oval, unicellular, and colorless. They soon put out a germ-tube, sometimes two, which again detach gonidia in a short time. Their further development was not observed.

In sowings upon gelatine which was mixed with a nutritive solution, the germ-tubes, unlike those sown in water, show a vigorous terminal growth, while their diameter increases very little; but even in this case the base remains thick and composed of short cells. The septa are formed at some distance behind the growing point, and numerous monopodial branches are also developed. On account of the large number of germ-tubes produced by the spore at the same time, and their vigorous growth, the mycelium attains a very considerable growth in a few days, in the center of which the dark-colored spore remains visible for some time.

After from five to six days some of the hyphæ which have come to the surface of the gelatine, or those that run just underneath it, send up numerous branches composed of one or two cells and bearing a pretty large spherical head, the study of which is not easy. When placed in water it goes to pieces at once, leaving only a mass of colorless, cylindrical cells 3–5μ. long and 1–2μ. in diameter. The structure can be seen only when it can be observed in moist air under a cover glass. At the end of each branch of the mycelium is a globose, gelatinous mass, which swells strongly upon the addition of water and finally breaks in pieces. In it are imbedded a considerable number of the cells already mentioned, lying close together and parallel (Fig. 9). They have been cut off from the sporophore, and the gelatinous mass is composed of the envelopes of the individual gonidia.

The ascospore has therefore produced a gonidia-forming mycelium, a *Hyphomycetes*, belonging to the form *Acrostalagmus*, as is shown by the peculiar structure of the fruiting head. This form seems to be different from that of *A. cinnabarinus*, Corda. When very finely developed it has the appearance of a reddish mat, but the sporophores are never branched as in *A. cinnabarinus.* The spores of the latter are smaller than those of the form under consideration, but the development of the spores and the relations of the gelatinous envelope differ in no way from those of *A. cinnabarinus.* When *Acrostalagmus* was cultivated independently, its development was much more luxuriant; but pycnidia never made their appearance in these cultures; it seemed as if gonidia always reproduced the same gonidial form. It should also be mentioned that when the leaves were infected with ascospores *Acrostalagmus* nearly always appeared.

The development of sporophores and formation of spores continues on the *Fenestella* mycelium for a long time. The great masses of spores which fall off during the study of the fungus often makes this very difficult, and it is principally owing to them that the ascospores themselves are no longer visible.

Afterwards new changes occur in the *Fenestella* mycelium. A dense mat is generally formed by the repeated branching of the hyphæ and the formation of new ones from spores. This mat is called a stroma, although it deviates considerably from that formed in nature. At first the stroma of the slide cultures is not black or brown, but yellowish, which is probably caused by the rapid development incident to abundant moisture, for as a rule old cultures and those kept dryer take on a darker color. It can also be ascribed to the same cause, that the separate hyphæ are more delicate than those observed in nature. The outer form of an artificially produced stroma is therefore different from the natural one, and it can attain considerable dimensions if the substratum is a favorable one. Besides it does not have the conical shape described above, but forms a thin layer about 1 millimeter thick, upon, instead of within, which are the later formed pycnidia. We will return to this point farther on.

About three or four weeks after the sowing of the ascospores, numerous brown bodies, about 1 millimeter in diameter, which proved to be pycnidia, made their appearance upon the stroma. They are usually arranged more or less in circles. In old stromata one often sees several concentric circles of pycnidia, since new rows are constantly being formed toward the circumference.

The pycnidia appear first as small knots of hyphæ; in certain places in the stroma the hyphæ wind much closer together; these points therefore appear darker, and are easily seen. These knots steadily increase in circumference for some time without any kind of differentiation. They represent merely small outgrowths of the stroma, nor do sections through this immature stage show anything but a homogeneous mass of hyphæ. Next, the young pycnidia begin to turn brown, that is, the outer layer of the tissue becomes dark colored and can be clearly distinguished as the rind. The remaining portion of the pycnidium remains unchanged until finally the hyphæ in the center move apart from each other, forming a small cavity (Fig. 10). This arises from the cessation of growth within the tissue, while the body continues to grow at the periphery. In this way the pycnidium develops into a spherical body containing a large cavity. Below, it is a little immersed in the stroma, but is distinctly separated from it by the outer layer. The wall is composed of two layers, the rind and a clearer layer within, also composed of irregularly interwoven hyphæ, without a trace of pseudo-parenchymatic structure. Immediately after the cavity begins to form, hyphal branches grow out into it and form a continuous hymenium. They cut off very small, cylindrical spores in great numbers. When the pycnidium is mature it ruptures in an irregular manner at the point, and the spores emerge in waxy, yellow, or whitish, worm-shaped masses.

In the preceding description a single pycnidium developing without any hindrance has been considered, but it is often the case that the first stages of any pycnidia arise close together. On account of the enlargement of the knots of hyphæ they collide, assume irregular forms, and grow together into various shaped bodies, yet in such a manner that the bounding lines of the individual pycnidia can be seen by the depressions between them. A rind following the depressions is formed on the outside; but within, the lateral walls are broken through by the formation of the cavities so that the compound body made up of many pycnidia possesses but one cavity. The depressions mentioned above correspond to projections upon the inside. The walls, consequently, appear wrinkled.

Now, are these pycnidia homologous with those with which the investigation started, the *Cytispora?* In the first place it may be stated that the form of the basidia and spores is the same in both, although they are as a rule a little smaller in the cultivated pycnidia. The structure of the walls agrees in the two, at least when the *Cytispora* pycnidia are young. The same things many be said of the older, black, and thick-walled pycnidia that have been said above concerning the stroma. The difference is more marked, because in the artificially produced specimens the pycnidia are superficial, while in the natural ones they are sunken into the stroma. It has, however, been shown that in *Cytispora* individual pycnidia may project beyond the stroma. As regards the artificial ones we have only a variation dependent upon external conditions.

To this correspond the relations of the spontaneous *Cytispora* upon other substrata than twigs. Spores of the same kind were sown upon a well sterilized wilted leaf. The result was a stroma with pycnidia, having exactly the same appearance of that produced upon the slide. Infections of living and dead branches with *Cytispora* spores were without result.

It may also be mentioned that the circular arrangement of the pycnidia upon the slide points to a Valsoid stroma.

The beginnings of the pycnidia and their transformation into irregular chambers can not be so easily studied in the natural as in the cultivated *Cytispora*. But the results are in no way contradictory. In the natural *Cytispora*, also, the beginnings appear as knots of hyphæ of a globose form, which are by the least growth of the stroma brought very close together, and consequently must change their form and even coalesce on further growth.

What has been said suffices to show that there is no difference between the *Cytispora* and the pycnidia produced upon the slide, and that such variations as are present are traceable to the conditions necessary in culture methods; the two are therefore homologous.

Now since the beginnings of *Fenestella* perithecia have been formed directly upon the stroma of *Cytispora*, and the development of *Cytispora*, from the ascospore has been observed step by step upon the slide, the life history of the fungus is closed for us. That perithecia should be produced under the conditions necessary to the culture method was not to be expected. They would likewise have arisen in the form of knots of hyphae within the circle of pycnidia.

Although the pycnidia are extraordinarily small and spermatia-like, they possess the power of germination. In a suitable nutritive solution the spores swell up greatly and develop two or three germ tubes, which are much enlarged at their bases, so that afterwards it is often hard to say which is the swelling and which the spore. They proceed to branch like a budding fungus, afterwards one branch shows a strong growth at one end. Otherwise the mycelium develops in the same manner as from the ascospore.

The life history of the *Fenestella* is, however, by no means completed with what has been recorded. In order to prove whether the fungus was related to the *Cytispora*, sowings of the ascospores were made upon *Platanus* leaves and produced what is presumably a new stage of this pleomorphic form.

The spores were sown in a drop of water and this placed upon the lower surface of fresh young leaves and these kept moist. Germination was observed in a few days, but the penetration of the germ tubes was not seen. The inoculated parts began to turn brown without the fungus becoming visible. Not until ten or fourteen days after inoculation, when the leaf had become brown and withered, did transparent points, which were most numerous along the nerves and less so upon the leaf surface, make their appearance. These points represent pycnidia, which are altogether different from those of *Cytispora.* They are situated under the epidermis, which they push up while their bases are more or less immersed in the leaf tissue. At the apex of the swellings the epidermis ruptures, forming an irregular roundish opening through which may be seen the ostiolum of the pycnidium, which will be described in detail below. The pycnidium is flattened and lenticular, yellowish in color, except the ostiolum, which is dark brown. Its walls, unlike those of the *Cytispora* (Fig. 11), are of a pronounced pseudoparenchymatic structure. They are clearly composed of two layers, the outer consisting of from one to three rows of flat cells with brown contents. Brown hyphæ usually originate from many of the superficial cells. This layer has a special structure at the apex of the pycnidium. It becomes much thicker and its cells take a radial direction, lying parallel to each other and forming papillæ-form projections on the surface. The papillæ are surrounded by a chaplet of long four or five-celled hyphæ, which arise from the outer cell and project beyond the epidermis. On account of the radial arrangement of the cells at this place the opening of the pycnidium will depend upon its time of maturity, since the cells are easily pushed apart. There is, therefore, here a similar arrangement to that in *Discula platani.*

Within this is a second layer of somewhat polygonal colorless cells which are flattened on the outside, but are more isodiametric within. The farther they are situated toward the interior the smaller their lumina. This layer bounds the cavity of the pycnidium, which is, however, very irregular, since the inner layer sends complex projections into it from all sides. From these, large round cells filled with dense contents arise everywhere. They are the basidia, but they do not form a continuous hymenial layer. They cut off oval (often rather cylindrical) unicellular colorless spores that measure 6–9 by 3–5μ.

These pycnidia are strongly characterized by the structure of their walls, and more especially of their apices, and the form of their basidia. Since little stress is laid upon these characteristics in systematic works, it was impossible to classify it in any existing genus. It would be superfluous to establish a new one, since in all probability it is only a stage in the life history of *Fenestella platani.*

Since the culture of these pycnidia in nutritive solutions was unsuccessful (concerning which more will be said) many questions relative to their development must remain unanswered. The youngest stage observed consisted of a knot of numerous coarse hyphæ (Fig. 12). It appears to originate from the *Cytispora*, although it is noticeably different from the beginnings of the *Cytispora* pycnidia. The number of hyphæ is smaller, but the hyphæ are proportionally stronger. Unfortunately it could not be determined whether the cell masses which projected into the cavity and bore a portion of the basidia are remnants of a ruptured tissue or whether they grow out from the inner layer of the wall after the formation of the cavity.

When sown upon gelatine and a nutritive solution the spores will in about twenty hours swell up and produce a germ tube. This develops into a mycelium of short-celled hyphæ whose growth soon ceases, while the cell contents become brown. In this way numerous more or less compact opaque masses of hyphæ are produced, which form a resting condition like sclerotia and may be called resting mycelia.

After remaining in a dry condition for some time these were again placed in a nutritive solution, the hyphæ masses began to grow again, but developed directly into an interwoven tissue and after a short space showed no further phenomena of growth.

But, on the contrary, if one of these resting conditions is placed on a leaf and kept moist the formation of pycnidia will follow. The pycnidia are therefore closely dependent upon the leaf, but this does not make them absolute parasites, since they only become apparent after the leaf is disorganized. Whether this disorganization was caused by the fungus or external causes is hard to say.

As already stated, the above described pycnidia which appear on the leaf are produced by sowing ascospores or by a perennial mycelium. They will develop also, however, if the spores formed in the pycnidia are sown on a leaf. Under the most favorable conditions of growth a pycnidia-forming mycelium arises from these, but under unfavorable circumstances a resting mycelium. Besides this the same pycnidia occurred after the sowing of *Cytispora* spores upon a fresh leaf, the latter being formed in a pycnidium produced under artificial cultivation. The manner of development of the pycnidia on the leaf was the same in all cases.

One important circumstance has not been mentioned. The pycnidia upon the leaves were in most cases accompanied by an *Acrostalagmus* form. But sowings of the latter on fresh leaves only produced the same form again.

We have now mentioned all the forms that could be obtained for observation which it is possible to suppose belong to the life history of *Fenestella platani.* The absolute proof of the connection between the ascospore and pycnidium is lacking in case of the pycnidia on the leaves. What has already been said makes it seem very likely that this stage is really connected with the *Fenestella.* As concerns the other forms, it is true that on the above grounds we can not trace the hyphæ from the gonidiophores of the *Acrostalagmus* back to the ascospores, still less can it be done for the later appearing pycnidia of the *Cytispora.* But the regularity with which both appear in all the cultures, and the similarity of the cultivated *Cytispora* pycnidia with the natural ones, leave no doubt as to their connection.

Aside from pycnidia on the leaves, the development of *Fenestella platani* is as follows:

The ascospores give rise to a mycelium which immediately cuts off gonidia—the *Acrostalagmus* stage. Later the mycelium develops into a stroma in which pycnidia are formed—the *Cytispora* stage. Finally perithecia break out of the stroma between the pycnidia—the *Fenestella* stage. Cultures of *Acrostalagmus* reproduced the same gonidial form, and no pycnidia; cultures of *Cytispora* both artificial and natural yielded the same pycnidia again. Under favorable circumstances, however, perithecia might be developed.

If the pycnidia that occur on the leaves really belong to *Fenestella*, then this fungus possesses both a parasitic and saprophytic cycle of development. The uncertainty which still exists in regard to this makes it undesirable to go farther in order to draw general conclusions.

(*To be continued.*)

PEACH ROT AND PEACH BLIGHT.

(*Monilia fructigena*, Persoon.)

By Erwin F. Smith, Sc. D.

For six years my attention has been drawn repeatedly to the serious losses resulting from the parasitism of *Monilia fructigena* upon plums and other stone fruits, and during the last three years my opportunities for observing its effect upon the peach have been unrivaled. These opportunities occurred principally in the great peach district lying between the Chesapeake and Delaware Bays. There, in the prosecution of the peach-yellows investigation, I have examined hundreds of orchards at all seasons of the year, and have incidentally made some very interesting observations on other diseases of the peach, particularly that resulting from the *Monilia*. It has also been my fortune to see this disease in the peach-belt of southwestern Michigan.

This fungus is more common, and far more destructive than any other observed on the peach in this country. It is rarely absent from the orchard, and in rainy weather it frequently destroys from one-half to three-fourths of the crop, in some cases the entire crop. Under its influence the fruit quickly loses its normal color and flavor, and becomes an entire loss to the grower. As the fungus invades the healthy tissues of the fruit the latter become leather-colored, or dark brown, and the peach is said to "rot," although, as Von Thümen first pointed out, the change is not strictly a rot. For the purposes of this paper it will, however, be convenient to follow the well-established popular usage and speak of this disease as the "peach rot."

So rapid are the changes induced by this fungus that sometimes the

The mycelium of the *Macrosporium* ramifies through and not between the cells of the host, and the fertile hyphæ bore their way to the surface through the outer cell wall of the epidermis, their apices apparently exerting some solvent action on cellulose. He has not observed them projecting from the stomata as Mr. Miyabe did.

Mr. Shipley further takes issue with Mr. Miyabe in regard to the parasitism of the fungus. He has never seen a plant suffering from *Macrosporium* that had not previously been attacked by *Peronospora*. In other respects, except the development of the perithecia, which he did not observe, his observations confirm those of Mr. Miyabe.—EFFIE A. SOUTHWORTH.

UNDERWOOD & COOK. *Generic Synopses of the Basidiomycetes and Myxomycetes.*

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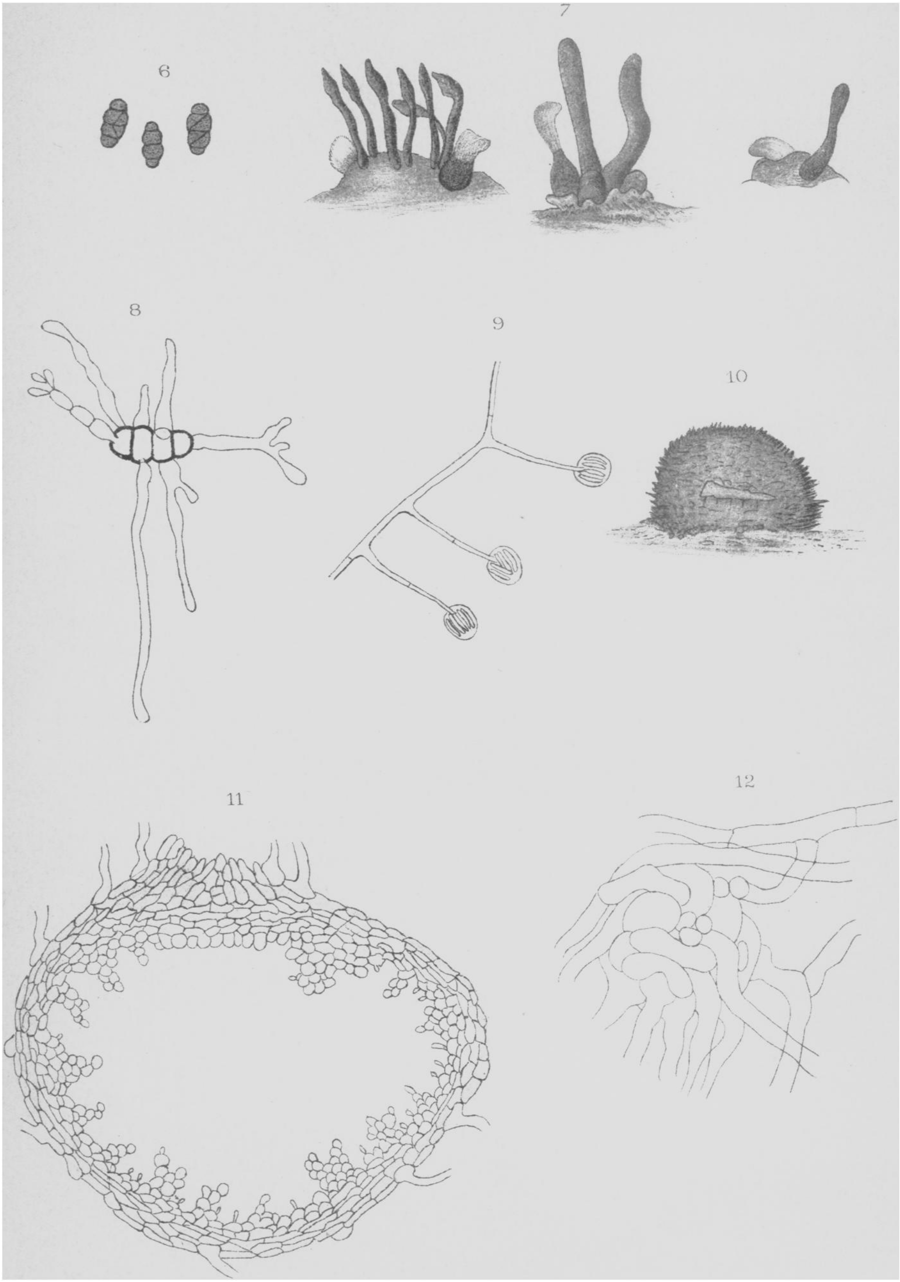
DESCRIPTION OF PLATES.

PLATE XI (*After von Tavel*).

FIG. 6. Ascospores. × 300.
7. External appearance of the stroma with perithecia and pycnidia. Slightly magnified.
8. Germinating ascospore, three days after being sown in water. × 600.
9. Hypha, with gonidiophores of *Acrostalagmus* in moist air. × 300.
10. Young pycnidium. The outer layer has become differentiated and the formation of the cavity has begun. × 80.
11. Vertical section through a pycnidium produced on a leaf. × 214.
12. Early stage of a pycnidium, from a cross-section through an infected leaf. × 700.

PLATE XII.

FIG. 1. *Mucronoporus Everhartii*, natural size.
2. A piece of the same showing length of pores in vertical section.
3. Longitudinal section of pores, with central portion cut out.
4. Spines enlarged.
5. Cross-section of pores.



VON TAVEL ON DEVELOPMENT OF THE PYRENOMYCETES.

FENESTELLA PLATANI.

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